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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/945,094	08/30/2001	Xuemei Zhang	10992481-1	3160

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EXAMINER
TRAN, NHAN T

ART UNIT	PAPER NUMBER
2615	3

DATE MAILED: 09/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/945,094	ZHANG, XUEMEI	
	Examiner	Art Unit	
	Nhan T. Tran	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 8/30/2001 .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-17 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-17 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) Supersede
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Objections

1. Claim 4 is objected to because of the following reason:

Claim 4 recites the limitation "the Ak values of each pixel" in the last line of claim 4. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 – 4, 6, 11 – 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Wagensonner et al (US 4,812,903).

Regarding claim 1, Wagensonner discloses a method of processing a pixel of a digital image (see Fig. 1; col. 5, lines 28-31 & lines 57-63), the method comprising:

applying a tone mapping function to a first color channel (Y1) of the pixel, the first color channel most closely matching relative luminance response of human visual system, whereby a value of the first color channel is changed by a scale factor (Y2/Y1); and applying the scale factor to all other color channels (U1 and V1) of the pixel (see Figs. 4 & 5; col. 11, line 26 – col. 12, line 29).

Regarding claim 2, the color channels corresponding to a positive color space (see Fig. 4 for the positive color space arranged in Y-U-V coordinates).

Regarding claim 3, Wagensonner further discloses adding noise balancing terms when computing scale factors for the other color channels (see Figs. 2 & 3; col. 10, lines 19-29 for noise suppression performed in contrast adjusting unit 15 which produces Y2 for use in calculation of Y2/Y1 as shown in Fig. 5).

Regarding claim 4, Wagensonner discloses a method of applying a tone-mapping function to a digital image represented in positive linear color space (see the same analysis in claims 1-3), the color space including an AL channel (Y1) and at least one Ak channel (U1 or V1), the AL channel most closely matching the relative luminance response of the human visual system, for each pixel (see Fig. 5) the method comprising:

applying a tone mapping function to the AL channel of each pixel to generate a tone-corrected relative luminance value A'L (Y2) for each pixel; and transforming the Ak values of

each pixel according to A'k = (Ak/AL) x A'L , which can be expressed as A'k = Ak x (A'L/AL) which is equivalent to equation (7) shown in col. 12, lines 15 – 29 and Fig. 5, wherein:

A'k is represented by U2 or V2,

Ak is represented by U1 or V1, and

A'L/AL is represented by Y2/Y1.

Regarding claim 6, Wagensonner inherently teaches that the pixels are processed independently, whereby a scale factor is specific to each pixel (see Fig. 5; col. 5, lines 28-32 & lines 57-63 & col. 8, lines 41-51. It is noted that each pixel has three primary color components, and these primary color components are processed separately).

Regarding claim 11, the claimed limitations are analyzed with respect to claim 1.

Regarding claim 12, the claimed limitations are analyzed with respect to claim 2.

Regarding claim 13, the claimed limitations are analyzed with respect to claim 3.

Regarding claim 14, the claimed limitations are analyzed with respect to claim 6.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 5, 7 – 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagensonner et al (US 4,812,903) in view of Hirose (US 5,557,429).

Regarding claim 5, Wagensonner teaches the transforming Ak values for each pixel according to A'k value during color correction and transformation of colors as analyzed in claim 4 but Wagensonner does not teach a noise balancing term to be added to each color channel, wherein the balancing term is a small positive number. However, as taught by Hirose, a noise quantity of a small positive number which is not perceived visually is added to each color channel during color correction and transformation processes to cancel the visual adverse effects by image noise, tone steps, and the like, which are inherently contained in the input image data signal so that a clear, good quality image is reproduced (see Figs. 2 & 12; col. 8, lines 23-40 & col. 9, lines 29-37. It is noted that there are missing equal signs (=) for color channel L'(x,y) and a'(x,y) in formula 3 due to typo errors. Furthermore, see Figs. 13 & 14 for a small positive number of noise balancing term around reference value 7).

Therefore, it would have been obvious to one of ordinary skill in the art to provide a noise balancing term having a small positive number to be added to each color channel during the color correction and transformation of colors in Wagensonner so that image noise, tone steps and the like contained in the original image are reduced without deteriorating the color tone and sharpness of the image.

Regarding claim 7, the claimed limitations of claim 7 are encompassed by claims 4 & 5, wherein XYZ color space is represented by YUV or La*b* color space disclosed by Wagensonner and Hirose (see Hirose in col. 6, lines 30-39).

Regarding claim 8, the noise balancing terms as disclosed by Hirose are a triplet of numbers proportional the white point (characteristics difficult to visually perceive) of CIE tristimulus channel system (see Hirose, Figs. 13 & 14 for reference value 7 and upper and lower values composing the triplet of numbers, and col. 9, lines 29-37 for the white point).

Regarding claims 9 & 10, Wagensonner and Hirose teach the modified color spaces are YUV and La*b* color spaces. Although Wagensonner and Hirose do not directly disclose the modified color space is RGB, an Official Notice is taken that the color spaces can be implemented interchangeably depending on certain applications.

Threfore, it would have been obvious to one of ordinary skill in the art to recognize that the teachings of Wagensonner and Hirose can be applied to any color space including RGB color space.

4. Claims 15 – 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagensonner et al (US 4,812,903) in view of Gindele et al (US 6,594,388).

Regarding claim 15, Wagensonner discloses all the limitations of claim 15 except for an expressly disclosure of using software instead of hardware to implement the processes as analyzed in claim 1. However, the implementation of image signal processing utilizing hardware circuitry can be realized by software or vice versa as taught by Gindele in col. 6, lines 5-42.

Therefore, it would have been obvious to one of ordinary skill in the art to use software instead of hardware to implement the teaching of Wagensonner.

Regarding claim 16, the claimed limitations are analyzed with respect to claim 2.

Regarding claim 17, the claimed limitations are analyzed with respect to claim 3.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Tran whose telephone number is (703) 605-4246. The examiner can normally be reached on Monday - Thursday, 8:00am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew B Christensen can be reached on (703) 308-9644. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

NT.

ANDREW CHRISTENSEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600